Towards simple rules heuristics for IT business value

Erwin Fielt
Queensland University of Technology

Shirley Gregor
Australian National University

Abstract

The business value of IT (BVIT) has been a prominent and central research topic in the IS discipline. Due to continuous and unpredictable technology and business changes, a more dynamic perspective on IT business value that includes organizational learning is required. We suggest that simple rules heuristics can address this challenge. The simple rules heuristics approach has been introduced by Eisenhardt and co-authors (Bingham & Eisenhardt, 2011; Bingham, Eisenhardt, & Furr, 2007; Eisenhardt & Sull, 2001) to better understand strategic decision making for capturing superabundant, heterogeneous, fast-moving opportunities. They argue that explicit organizational learning can translate accumulated experience into increasingly effective heuristics for strategic processes in high-velocity environments. We make three main contributions by exploring the suitability of a simple rules heuristics approach for the creation of IT business value: (1) we propose six types of simple rules heuristics for capturing IT-based opportunities in dynamic environments, including synergy heuristics as specifically relevant in an IT context, (2) we show how a simple rules heuristics approach can advance our understanding of dynamics and organizational learning for BVIT, and (3) we introduce the strategic logic of opportunity to BVIT.

1. Introduction

The business value of IT (BVIT) has been a prominent research topic in the IS discipline, and some even argue that it should have centrality in the IS field (Kohli & Grover, 2008). Melville, Kraemer, and Gurbaxani (2004) define the business value of IT as 'the organizational performance impacts of information technology at both the intermediate process level and the organization-wide level, and comprising both efficiency impacts and competitive impacts' (p. 287). Due to continuous and unpredictable technology and business changes (e.g., Benamati & Lederer, 2001; Lyytinen & Rose, 2003; Newkirk, Lederer, & Johnson, 2008), a more dynamic perspective on BVIT becomes necessary (e.g., Pavlou & El Sawy, 2010; Wolf, Beck, & Pahlke, 2012). A dynamic perspective on BVIT requires

organizational learning (e.g., Bhatt & Grover, 2005; Sambamurthy, Bharadwaj, & Grover, 2003; Wheeler, 2002). However, so far little attention has been paid to what organizational learning is needed for the creation of business value with IT.

Recently, Eisenhardt and co-authors (Bingham & Eisenhardt, 2011; Bingham et al., 2007; Eisenhardt & Sull, 2001) have introduced 'simple rules heuristics' as a cognitive approach to learning in strategic processes centred on capturing discrete opportunities for growth and profit amongst a superabundant flow of related yet heterogeneous opportunities (e.g., internationalisation opportunities, product innovation opportunities, acquisition opportunities). They see simple rules heuristics as articulated and often informal rules of thumb that are shared by multiple participants within the organization and provide cognitive shortcuts in decision-making. We propose that simple rules heuristics is a promising approach for BVIT in order to address organizational learning and dynamics. Moreover, this approach also introduces a 'strategic logic of opportunity' (Bingham & Eisenhardt, 2011; Bingham et al., 2007; Eisenhardt & Sull, 2001), which has received little attention in the IS discipline so far. An opportunity logic is particularly relevant for BVIT when there is a need to capture the opportunities from a continuous stream of IT innovation (e.g. mobile apps, social media, business analytics, etc.) sooner, faster and more effectively than competitors in a high-velocity environment. This is particular the case for established companies that are continuously confronted with new IT-based products, services and business models introduced by start-ups and the IT industry.

The objective of this paper is to explore the suitability of a simple rules heuristics approach for the creation of IT business value by addressing 2 main questions: (1) what types of simple rules heuristics apply to BVIT and (2) what does a simple rules heuristics approach mean for our understanding of BVIT, in particular with respect to organizational learning and dynamics? The paper has three main contributions: (1) it proposes six types of simple rules heuristics for capturing IT-based opportunities in dynamic environments, including synergy heuristics as specifically relevant in an IT context, (2) it shows how simple rules heuristics can advance our understanding of dynamics and organizational learning for BVIT, and (3) it introduces the strategic logic of opportunity to BVIT. The remainder of this paper is structured as follows. First we examine both traditional and more dynamic BVIT models and the role of organizational learning. Next we present an overview of simple rules heuristics, based on the seminal work of Eisenhardt and co-authors. Then we propose six types of simple rules heuristics for BVIT. Thereafter we reflect on what simple rules heuristics means for BVIT in relation to organizational learning, dynamics and opportunity logic. We end with concluding remarks and limitations.

2. Literature review on IT Business Value

Melville et al. (2004) define IT business value research as 'any conceptual, theoretical, analytic, or empirical study that examines the organizational performance impacts of IT' (p. 288). Kohli and Grover (2008) describe the received view of IT business value research as understanding how IT investments interact with mediating factors in order to create business value. This section takes a closer look at the BVIT literature. First we discuss the traditional IT business value models. Then we address dynamic BVIT models that include organizational learning and discuss organizational learning in more detail.

2.1. Traditional BVIT models

The traditional BVIT model is commonly a causal model with IT in some form as the independent factor and business value in some form as the dependent factor (e.g., Melville et al., 2004). The IT in BVIT models is often IT investments (e.g., Quan, Hu, & Hart, 2003) or IT resources (e.g., Melville et al., 2004). IT resources can be IT assets and/or IT capabilities (Aral & Weill, 2007; Wade & Hulland, 2004). Business value can be of diffident types (e.g.

profitability, productivity, process performance) and levels (e.g. individual, organization) (Kohli & Grover, 2008). While some studies look at firm performance in general (e.g., Melville et al., 2004), other studies focus specifically on (sustainable) competitive advantage (i.e., differential value) (e.g., Piccoli & Ives, 2005).

The relationship between IT and business value is mostly presented as an indirect relationship with intermediate outcomes mediating between IT and business value (Soh & Markus, 1995). Mediating factors include the business process (e.g., Dehning & Richardson, 2002; Melville et al., 2004) and information or knowledge (e.g., Sambamurthy et al., 2003; Tippins & Sohi, 2003). Strategic BVIT models often have (IT-enabled) organizational capabilities as a mediating factor (e.g., Nevo & Wade, 2010; Ravinchandran & Lertwongsatien, 2005; Rivard, Raymond, & Verreault, 2006; N. Wang, Liang, Zhong, Xue, & Xiao, 2012). In addition, organizational complementarities often play an important role in BVIT models (e.g., Kohli & Grover, 2008; Melville et al., 2004; Wade & Hulland, 2004).

Traditional IT business value models often use the Resource Based View (RBV) as a theoretical foundation (e.g., Bharadwaj, 2000; Mata, Fuerst, & Barney, 1995; Melville et al., 2004), sometimes complemented by insights from (empirical) strategic IS/IT research (Wade & Hulland, 2004). The RBV focuses on how organizations can gain competitive advantage by differentiating themselves in their collection of resources (heterogeneity) and how they can sustain competitive advantage by virtue of the inability of other firms to obtain comparable resources (immobility) (Barney, 1991). The RBV is useful for the IS field as it can help understanding how information systems relate to firm strategy and performance, in particular in evaluating the strategic value of information systems resources and in differentiating among various types of information systems (Wade & Hulland, 2004).

2.2. Towards dynamic BVIT models and organizational learning

Because most BVIT models have been static and mainly based on RBV, a more dynamic approach to BVIT seems to be appropriate in the light of continuous, and sometimes disruptive, IT innovation and for organizations operating in high-velocity environments. The few dynamic BVIT models that have been introduced so far mostly base themselves on Dynamic Capabilities Theory (DCT). DCT was introduced as an expanded paradigm of the RBV to address rapid and unpredictable change, in particular for strategic issues such as skill acquisition, learning, and asset reconfiguration (Teece, Pisano, & Shuen, 1997). The focus moved to ‘dynamic capabilities’ with ‘dynamic’ referring to the firm’s ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments (Teece et al., 1997). Dynamic capabilities focus on changing an organization’s ordinary or ‘operational’ capabilities (i.e., ‘how we earn a living now’) and are different from change through ad hoc problem solving as they involve patterning of activity and long-term commitments to specialized resources (Winter, 2003).

One of the first dynamic BVIT models is the ‘Net-Enabled Business Innovation Cycle’ (NEBIC) (Wheeler, 2002). NEBIC is an applied dynamic capabilities theory for measuring, predicting, and understanding a firm’s ability to create customer value through the business use of digital networks’ (Wheeler, 2002, p. 125). The dynamic capability of net enablement combines four simple capabilities: ‘Choosing Emerging/Enabling Information Technologies’ (ET), ‘Matching Economic Opportunities with ET’, ‘Executing Business Innovation for Growth’ and ‘Assessing Customer Value.’ Organizational learning plays an important part in improving the dynamic capability of net-enablement over time. Wheeler positions organizational learning for NEBIC mainly as a communication process with primary processes and secondary processes. In the primary processes, insights gathered from real marketplace data via the Assessing capability flow to the other capabilities. In the secondary processes, soft insights flow from adjacent capabilities to antecedent capabilities.

Other dynamic BVIT models also include organizational learning. For example, Daniel and Wilson (2003) set out to identify dynamic capabilities that are necessary for the innovative or integrative aspects of e-business transformation and that can be considered as 'best practice.' They stress that for the development of dynamic capabilities learning-by-doing needs to be in balance with learning-before-doing appropriate to market velocity. Sambamurthy et al. (2003) address how digital options and agility mediate between IT competence and competitive actions. They refer to 'co-evolutionary adaptation' to describe the learning-by-doing of capability-building and entrepreneurial action processes through feedback and experience when firms launch a variety of competitive actions over time. Bhatt and Grover (2005) argue that demarcating specific types of capabilities (i.e., value, competitive, and dynamic capabilities) can contribute to a better understanding of the sources of IT-based competitive advantage. They frame dynamic capabilities as the intensity of organizational learning, which involves the accumulation, sharing, and application of knowledge. Piccoli and Ives (2005) present a dynamic approach to IT-dependent strategic advantage. They position organizational learning as a dynamic process that reinforce barriers to erosion and see it as a process based on experience, specifically learning-by-using.

Organizational learning is generally seen as 'a change in the organization's knowledge that occurs as a function of experience' (Argote, 2013, p. 31). Learning is related to changes in behaviour: 'an entity learns if, through its processing of information, the range of its potential behaviors is changed' (Huber, 1991, p. 89). According to Huber, information processing can involve acquiring, distributing and interpreting information and requires organizational memory for storing information. Bingham et al. (2007) argue that organizational learning literature traditionally emphasises the role of experience without being clear about what is actually learned from experience and how that learned content leads to higher performance. They argue that there is a need for paying more attention to organizational cognition and opening up the 'black box' of what is learned from experience (i.e., the content of learning). The literature addressing organizational learning for BVIT does not address organizational learning in great detail and is also unclear about what is learned for creating IT business value. The same holds, to the best of our knowledge, for the literature in the related areas of IS/IT strategy and IS/IT innovation where organizational learning has received limited attention too and the content of the learning has also not been specifically addressed. A notable exception is, for example, Ciborra (1992) who stresses the role of organizational learning for strategic information systems but he focuses more on the process of learning (e.g. tinkering) than the content of learning.

In summary, while traditional BVIT models that are mainly static and based on RBV are still dominant in the IS discipline, alternative BVIT models that are more dynamic and based on DCT are gaining prominence. However, while the dynamic BVIT models recognize the importance of organizational learning for creating IT business value, they do not address organizational learning in great detail and do not specify what is learned.

3. The simple rules heuristics approach to organizational learning

In this section we will introduce simple rules heuristics as an approach to organizational learning that is useful for strategic processes in dynamic environments. The use of simple rules heuristics is a novel idea compared to the use of accumulated experience for organizational learning and routines for strategic processes. The simple rules research originated from an interest in repeated product innovation by organizations engaged in continuous change (Eisenhardt & Brown, 1997). This resulted in the notion of *semi-structure*, which refers to organizational arrangements where some features are prescribed or determined (e.g., responsibilities and priorities), but others are not (e.g. improvisation in product design). According to Eisenhardt and Brown (1997), semi-structures allow

organizations to balance between order and chaos and achieve high performance by being efficient via repeatability as well as flexible via improvisation. This research developed from product innovation to strategic processes and from semi-structures to simple rules and heuristics (Bingham & Eisenhardt, 2011; Bingham et al., 2007; Eisenhardt & Sull, 2001).

Eisenhardt and Sull (2001) stress that a strategy based on *simple rules*[1] is the most suitable approach in high-velocity markets where competitive advantage comes from successfully pursuing short-lived opportunities instead of leveraging resources or establishing market positions. In subsequent research, simple rules are viewed as *heuristics*[2] , which are articulated and often informal rules of thumb that are shared by multiple participants within the organization and provide cognitive shortcuts in decision-making (Bingham & Davis, 2012; Bingham et al., 2007). Simple rules heuristics centre on capturing discrete opportunities in a superabundant flow of opportunities (Bingham & Eisenhardt, 2011; Bingham et al., 2007). Simple rules as deliberate rules of thumb deal directly with *what is learned* (i.e., the content of learning) from strategic processes in dynamic markets and what makes these processes high performing. Heuristics differ from routines, which are most commonly used to explain what is learned from strategic processes. Routines provide a very detailed, often quasi-automatic response to narrow problems that may not even be viewed as problems (since a solution is available), whereas heuristics provide a common structure for a range of similar problems, but supply few details regarding specific solutions to address them (Bingham & Eisenhardt, 2011; Cohen et al., 1996).

Eisenhardt and Sull (2001) suggest that different types of rules are required to manage the different aspects of capturing opportunities and discussed boundary rules, how-to rules, priority rules, timing rules, and exit rules. Empirical research by Bingham and Eisenhardt (2011; 2007) showed that organizations learn *portfolios of heuristics* and identified a developmental order in how organizations learn heuristics. Organizations initially learn selection and procedural heuristics, which are lower order heuristics that focus on capturing a single opportunity. *Selection heuristics* are 'deliberate rules of thumb for guiding which sets of product or market opportunities to pursue (and which to ignore)' (Bingham & Eisenhardt, 2011, p. 1448). *Procedural heuristics* are 'deliberate rules of thumb for guiding the execution of a selected opportunity' (Bingham & Eisenhardt, 2011, p. 1448). After organizations learned selection and procedural heuristics, they started to learn temporal and priority heuristics, which are higher order heuristics that link multiple opportunities together and require more experience and cognitive sophistication to learn. *Temporal heuristics* are 'deliberate rules of thumb for opportunity capture that relate to time' (e.g., sequence, rhythm, pace) (Bingham & Eisenhardt, 2011, p. 1450). *Priority heuristics* are 'deliberate rules of thumb that rank opportunities' (Bingham & Eisenhardt, 2011, p. 1450).

Bingham et al. (2007) compare organizational learning based on accumulated experience with organizational learning based on articulated heuristics and conclude that heuristics are at the heart of high performing organizational processes. Bingham et al. (2007) argue that while experience may improve process performance, active learning by which organization participants translate their accumulating experience into increasingly effective heuristics for a strategic process is more likely to be associated with a higher performing process. Moreover, organizations manage the complexity of what is leaned by engaging in *simplification cycling* (Bingham & Eisenhardt, 2011). Simplification cycling consists of the elaboration and simplification of heuristic portfolios as organizations gain experience. Organizations develop more current, comprehensive heuristics portfolios by elaborating the number and detail of heuristics. They also simplify their heuristic portfolios by pruning heuristics; this contributes to replacing initial, naïve heuristics with higher-quality ones (i.e. more strategic, abstract, and

[1] The notion of simple rules comes from complexity theory and is based on the insight that fairly simple rules can result in complex behaviour.

[2] 'Simple rules' heuristics shares a common view of heuristics with 'heuristics-and-biases' and 'fast-and-frugal' heuristics in cognitive psychology but differ in substantial ways due to their distinctive origins, canonical problems, the kind of heuristics, performance metrics and contexts (Bingham & Eisenhardt, 2014).

precise) and keeping the heuristics portfolios small to stay flexible and prevent overfitting heuristics to experiences.

Simple rules heuristics have a positive impact on the performance of strategic processes by enabling effective opportunity capture through (1) balancing efficiency via focusing attention and saving time with flexibility via improvisation, (2) are easy to remember, communicate and update and (3) can be surprisingly effective when experience is limited and information is correlated, and (4) can outperform information intensive, analytically complex approaches as these can 'overfit' solutions based on past experience and can result in focussing too much attention on less relevant details (Bingham & Eisenhardt, 2011, 2014; Bingham et al., 2007).

Based on the need to better understand organizational learning for BVIT and the potential of simple rules heuristics as an approach to organizational learning that is useful for strategic processes in dynamic environments, we set out to explore the suitability of simple rules heuristics to the creation of IT business value. In particular, we will addresses 2 questions: (1) what types of simple rules heuristics apply to BVIT and (2) what does a simple rules heuristics approach mean for our understanding of BVIT, in particular with respect to organizational learning and dynamics?

4. Towards simple rules heuristics for BVIT

What types of simple rules heuristics apply to creating IT business value, in particular capturing IT-based opportunities in dynamic environments? The most obvious answer is selection, procedural, priority, and temporal heuristics as discussed above. However, these heuristics are based on internationalisation, so we will need to assess if they also apply to strategic processes for IT-based opportunities. Moreover, other types of simple rules heuristics could also play an important role for IT-based opportunities due to the specific nature of IT resources. We will argue that there is a need for exit and synergy heuristics in an IT context. Table 1 provides an overview of the suggested types of simple rules heuristics for BVIT. We will discuss each type in more detail below.

Table 1. Simple rules heuristics for BVIT

Simple rules heuristic[3]	**Description**	**Internationalisation example** (empirical)[4]	**BVIT example** (fictitious)
Selection	Guiding which opportunities to pursue (and which to ignore)	Target wholesalers and independent retailers	Focus on the creation of customer value
Procedural	Detailing the actions to execute a selected opportunity	Use greenfield entry mode	Start with experiments in a testbed
Priority	Specifying the ranking of opportunities or actions	Greatest priority on government accounts	Target corporate wide solutions first
Temporal	Determining the timing of opportunities or actions	Sell through partners first, then direct	Launch in e-commerce unit first, then others
Exit	Deciding when to pull out of opportunities or actions	NA	Abandon projects that don't have a champion
Synergy	Identifying the opportunities for IT and organizational resources working together	NA	Leverage customer to customer relationships

Selection heuristics support an organization in determining which opportunities to pursue and which to ignore (Bingham & Eisenhardt, 2011; Bingham et al., 2007). Within the context of IT strategy, there have been two pathways that can be followed for IT-based

[3] Selection, procedural, temporal and priority heuristics based on Bingham and Eisenhardt (2011; 2007), exit heuristic based on Eisenhardt and Sull (2001), and synergy heuristic based on Nevo and Wade (2010).
[4] Internationalisation examples as presented by Bingham and Eisenhardt (2011) as representative quotes from their case studies.

opportunities: IT-driven and IT-enabled. IT-driven opportunities (or technology push) start from new, innovative technologies with IT as operant resource, while IT-enabled (or market pull) opportunities start from new, innovative business concepts with IT as operand resource (Nambisan, 2013). A similar differentiation can be found in the Business-IT alignment literature where either business strategy or IT strategy can be the driver of alignment (Henderson & Venkatraman, 1993). Selection heuristics relate to 'Choosing Emerging /Enabling Information Technologies' in NEBIC (Wheeler, 2002). Wheeler differentiates between emerging technologies and enabling technologies. Emerging technologies are beyond the proof-of-concept stage, but not yet (widely) commercially available. Enabling technologies are commercially available and are becoming pervasive in and industry or market.

Procedural heuristics detail the actions to execute a selected opportunity (Bingham & Eisenhardt, 2011; Bingham et al., 2007). The procedural aspects of the strategic process for IS have received considerable attention in the literature as part of IS strategy development (e.g., Chen, Mocker, Preston, & Teubner, 2010) and strategic IS planning (e.g., Scott, 2005; Segars & Grover, 1999). According to Earl (1989), there are three planning processes for IT strategy formulation: top-down, bottom-up and inside-out. Top-down planning starts from business plans and goals and follows an analytical process. Bottom-up planning starts from current systems and follows an evaluative process. Inside-out planning starts from IT opportunities and follows a creative process. Inside-out planning follows an explorative approach that is concerned with innovation and creativity (Philip, 2007). Procedural heuristics provide how-to rules for the creative process as they allow for improvisation because their semi-structure enables the flexibility and responsiveness needed for seizing new opportunities in dynamic markets (Bingham et al., 2007). Pavlou and El Sawy (2010) discuss improvisation as an alternative to formal planning and stress its role in spontaneously reconfiguring existing resources and to building new operational capabilities, in particular in highly turbulent environments.

Priority heuristics specify the ranking of opportunities or actions (Bingham & Eisenhardt, 2011; Bingham et al., 2007). Prioritisation has always been an important part of the IT investment decisions and as such also been part of (strategic) IS planning. For example, Jiang and Klein (1999) discuss IS project selection and conclude that the applied selection criteria depend on the strategic posture. Organizations that have high strategic expectations rely more on organizational goals, management support and environmental factors while organizations that have low strategic expectations of IS rely more on management support, political considerations, and risk. In general, it has been recognized for a long time that different types of IT benefits require different ways to evaluate IT investments and that investment approaches can range from hard and tangible to soft and intangible (e.g., Robson, 1997; Ross & Beath, 2002). More advanced IT investment approaches use portfolio management that differentiate between different types of IT investment (e.g., Jeffery & Leliveld, 2004; Weill & Aral, 2006).

Temporal heuristics determine the timing of opportunities or actions, for example the sequencing, pacing and rhythm (Bingham & Eisenhardt, 2011; Bingham et al., 2007). From a strategic perspective, temporal aspects of IS have been discussed in relation to the industry or market, for example, whether the organization should be a first-mover or a fast follower (e.g., Clemons & Row, 1991) and to what extent competitive advantage can be sustained over time (e.g., Piccoli & Ives, 2005). With respect to business-IT alignment, there are perspectives where IT strategy is following business strategy and perspectives where business strategy is following IT strategy (Henderson & Venkatraman, 1993). Temporal aspects also feature prominently in the IS innovation literature. The adoption and diffusion of IS innovations within and across organizations over time has been a prominent topic (e.g., Swanson, 1994). For example, the adoption of new IS may show a significant assimilation gap, i.e. the difference between the moment of acquisition and the moment of deployment

due to knowledge barriers, increasing returns, and different decision processes (Fichman & Kemerer, 1999).

Based on the above discussion, we conclude that the selection, procedural, priority, and temporal heuristics as introduced by Bingham and Eisenhardt (2011; 2007) are suitable types of simple rules heuristics for capturing IT-based opportunities as they relate to strategic aspects of IS. However, while the different domains the heuristics relate to are more or less addressed in IS research, this research has not followed an approach that stresses simple rules heuristics as the content of organizational learning for strategic processes directed towards capturing IT-based opportunities in dynamic environments. The next question is whether there are any other types of simple rules heuristics that may also play an important role for capturing IT-based opportunities. We suggest that in an IT context, there may also be a need for exit and synergy heuristics.

While Eisenhardt and Sull (2001) also discuss exit rules, Bingham and Eisenhardt (2011; 2007) did not identify these in their case studies. This may be caused by the specific context of their research: the internationalisation processes of entrepreneurial organizations. According to Eisenhardt and Sull (2001), exit rules are about deciding when to pull out of opportunities or actions. Exit rules are relevant for IT-based opportunities, not only in relation to older, legacy technology or escalating IT projects but also for new technology. It is often hard to determine which new technologies and applications can add value for an organization so organizations may make less favourable decisions, in particular if an organization is an early adopter. Strategic, innovative IT initiatives are high-return but also high risk (Weill & Aral, 2006). Investment approaches for innovative IS like real options (e.g., Fichman, 2004) are suggested to increase managerial flexibility in project execution. This also means that projects due to their high-uncertainty are more likely redirected or terminated. Technology fashions (e.g., Wang, 2010) can also make that organizations start projects for social approval but then have to abandon projects that fail to live up to the expectations, in particular in terms of their performance impact. Moreover, organizations often need to experiment with new technology as there is still a lot of uncertainty (e.g., Ross & Beath, 2002) and they need to obtain the required managerial and technology knowledge and skills (Attewell, 1992; Fichman & Kemerer, 1999). After experimentation, organizations may choose to abandon the technology.

Finally, we suggest that synergy heuristics will play a role in capturing IT-based opportunities. As is evident from the BVIT literature, mostly IT resources do not directly result business value. IT resources need complementaries to create and capture IT-based opportunities (Kohli & Grover, 2008; Melville et al., 2004; Wade & Hulland, 2004). Nevo and Wade (2010) define IT-enabled resources as 'systems that are formed through relationships between IT assets and organizational resources' (p. 166). They argue that the interactions of the components in these systems give rise to positive emergent capabilities, i.e. potential synergy. To realize this synergy, the components in IT-enabled resources need to be compatible and easy to integrate. This is similar to 'Matching Economic Opportunities with Emerging/enabling Information Technology' and 'Executing Business Innovation for Growth' in NEBIC (Wheeler, 2002). Swanson and Ramiller (1997) use a cognitive perspective for making sense of IS innovations in an organizational context. They introduce the notion of 'organizing vision,' which refers to 'a focal community idea for the application of information technology in organizations' (p. 460). While Swanson and Ramiller focus on the community level, we suggest that a similar sensemaking can take place on the organizational level and that this relates to the synergy between IT resources and organizational resources.

In summary, we suggest that a simple rules heuristics approach can play an important role in understanding how organizations create IT business value, in particular how they can capture IT-based opportunities in dynamic environments. We argue that six types of heuristics play an important role in an IT context: selection, procedural, priority, temporal, exit and synergy heuristics. Next we reflect on what a simple rules heuristics approach

means for our understanding of BVIT, in particular with respect to organizational learning and dynamics.

5. Further reflection on simple rules heuristics for BVIT: Organizational learning, dynamics and opportunity logic

IT business value models have started recognizing the importance of dynamics and organizational learning. We will argue that a simple rules heuristics approach can advance our understanding of organizational learning and dynamics in relation to BVIT. In addition, we also propose that a simple rules heuristics approach can introduce the strategic logic of opportunity to BVIT, which has so far mainly used the logics of leveraging and positioning.

5.1. Organizational learning for BVIT

Simple rules heuristics can provide the starting-point for better understanding what organizations learn from process experience (i.e., the content of learning) when they try to create business value with IT resources. Specifically, we propose that organizations learn a portfolio of simple rules heuristics for capturing IT-based opportunities in dynamic environments, as discussed above. According to Bingham and Eisenhardt (2011), this learned content reflects 'the active, pragmatic approach of mindful problem solvers who are facing spotty information, limited time and attention, and too many diverse opportunities' (p. 1458). A simple rules heuristics approach stresses that process performance is improved by *explicit* learning, which captures what firm members collectively articulate as having been learned from their experiences. (Bingham & Eisenhardt, 2011). Note that explicit learning does not require a codified form, in particular when experience is diverse. Moreover, the developmental order and simplification cycling may provide further insights into the processes of organizational learning for BVIT. The simple rules heuristics can draw attention to a common rule structure for a range of problems for BVIT based on heuristics instead of extensive detail and exact steps for specific solutions based on routines.

Is a simple rules heuristics approach for capturing IT-based opportunities new to the IS discipline? To the best of our knowledge, this approach has not yet been applied to the IS domain, in particular in relation to BVIT. There has been some related work in literature about IT governance or management principles. Weill and Ross (4004), for example, see IT principles decisions as 'high-level statements about how IT is used in the business' (p. 27) and argue that a small number of clearly articulated IT principles can support organizations in creating business value with IT. Davenport, Hammer, and Metsisto (1989) also stress the need for a set of IT management principles in the form of simple, direct statements that summarize how an organization would use IT to achieve its goals over the long term. However, there is little attention for the types of principles that play a role in the strategic process and the temporal order and simplification as specifically addressed by Bingham and Eisenhardt (2011; 2007). Moreover, as opposed to simple rules heuristics, these principles focus more on the IT architecture than on capturing IT-based opportunities and are harder, prescriptive rules rather than softer, flexible rules of thumb. The semi-structure of simple-rules heuristics leaves room for mindful cognitive engagement and allows for improvisation, so organizations can adapt them to the unique aspects of each opportunity and the uncertainty of their situation (Bingham et al., 2007).

5.2. The dynamics of BVIT

Simple rules heuristics for BVIT will suit particularly well within the dynamic business and technology environments in which IT operates. The IT environment is highly dynamic with new technologies and applications being introduced frequently, for example, in the last few

years developments like mobile apps, social media, business analytics and cloud computing have changed the way we think about IT and what we do with it. Moreover, the business environment where IT is applied is also highly dynamic with developments like globalization, GFC, blurring of industry boundaries, increased competition, outsourcing, etc. Different authors argue that in dynamic environments, IT has to be managed in a different ways (e.g., Pavlou & El Sawy, 2006; Wade & Hulland, 2004; N. Wang et al., 2012). In these dynamic environments, simple rules heuristics can be the foundation for value-creating strategies that are more effective than information-intensive, cognitively demanding approaches (Bingham & Eisenhardt, 2011). Davis, Eisenhardt, and Bingham (2009) show based on simulations that a strategy based on a few simple rules heuristics is essential in unpredictable environments and can also be viable in predictable environments. Eisenhardt, Furr, and Bingham (2010) see simple rules heuristics as a means to introduce flexibility into strategic processes of older and larger organizations that operate in dynamic environments and have drifted too much towards efficiency.

Bingham and Eisenhardt (2011; 2007) particularly argue that simple rules heurists are central to dynamic capabilities as organizational process are a key feature of capabilities and organizational cognition is essential for developing high-performing processes. As dynamic capabilities are making their way into BVIT (e.g., Daniel & Wilson, 2003; El Sawy, Malhotra, Park, & Pavlou, 2010; Pavlou & El Sawy, 2010; Wheeler, 2002), simple rules heuristics can contribute to a better understanding of dynamic capabilities in BVIT, in particular in relation to capturing IT-based opportunities. For example, Wheeler (2002) proposes that an organizations needs a strong set of sustainable NEBIC capabilities to attain marketplace leadership. However what 'strong' means may be quite different depending on whether the capabilities are seen as routines or heuristics. Moreover, NEBIC capabilities based on simple rules heuristics may also be an alternative for organizations that are not able accumulate enough process experience (e.g., through lack of planning or high turbulence) or face resource constrains for developing routines in terms of an increasingly reliable and complete set of action steps (Eisenhardt & Martin, 2000; Pavlou & El Sawy, 2010). Wolf et al. (2012) discuss the role of organizational mindfulness as dynamic capability in BVIT with a focus on the IT innovation assimilation process. Simple rules heuristics can provide more insight into what organizations need to be mindful about and how this mindfulness can develop over time by providing insights into a common structure and developmental order.

5.3. Strategic logic of opportunity for BVIT

In addition to better understanding the dynamics of BVIT and the content of organizational learning, a simple rules heuristics approach also supports the strategic logic of opportunity for BVIT. Eisenhardt and Sull (2001) and Bingham and Eisenhardt (2008) discuss three different types of strategic logic: leverage, position and opportunity. A leverage logic focuses on how organizational resources can create superior performance. This logic is most closely associated with the RBV and assumes a moderately dynamic market. A position logic focuses on how a unique and valuable position – by doing activities differently or doing different activities – can create superior performance. This logic is most closely associated with activity systems (Porter, 1996) and assumes a relatively stable market. An opportunity logic focuses on how entrepreneurial action, in particulate the ability to capture attractive opportunities sooner, faster and more effectively than competitors, can create superior performance. This logic is most closely associated with semi-structured organizational processes that use simple rules heuristics to guide opportunity capturing and assumes a high-velocity market (e.g. product innovation, internationalization, alliances).

While the strategic logics of leverage and position are widely applied within the IS discipline, in particular for BVIT, IS/IT strategy and strategic information systems (e.g., Porter, 2001; Wade & Hulland, 2004), the strategic logic of opportunity has received little attention so far. Simple rules heuristics for BVIT can support and develop this logic within the IS domain, in

particular with a focus on the strategic processes for capturing IT-based opportunities around the more strategic and innovative technologies and applications. Underlying the simple rules heuristics for capturing opportunities is a focus on the selection and execution of opportunities as opposed to the creation or discovery of opportunities (Bingham et al., 2007). This is based on the assumption that in dynamic markets opportunities are often superabundant, heterogeneous, and fast moving. This does also apply to IT where the continuous introduction of innovative technologies and applications creates an opportunity rich environment. This is particular the case for established companies that are continuously confronted with new IT-based products, services and business models introduced by start-ups and the IT industry. In this environment simple rules heuristics can provide the structure and flexibility to capture opportunities with a focus on selection and execution instead of creation and discovery. Bingham and Eisenhardt (2011) stress particularly the role of simplification cycling for a strategic logic of opportunity as this is essential in creating and maintaining a small range of high-quality heuristics that guide the flexible capture of opportunities. This means that BVIT research into an opportunity logic should not only look at the portfolio of heuristics, but also at the elaboration and simplification of the portfolio.

6. Concluding remarks

The business value of IT (BVIT) has been a prominent and central research topic in the IS discipline. Due to continuous and unpredictable technology and business changes, a more dynamic perspective on IT business value that includes organizational learning is required. We suggested that simple rules heuristics can address this challenge. The simple rules heuristics approach has been introduced by Eisenhardt and co-authors (Bingham & Eisenhardt, 2011; Bingham et al., 2007; Eisenhardt & Sull, 2001) to better understand strategic decision making for capturing superabundant, heterogeneous, fast-moving opportunities. They argue that explicit organizational learning can translate accumulated experience into increasingly effective heuristics for strategic processes in high-velocity environments.

We set out to explore the suitability of a simple rules heuristics approach for the creation of IT business value by addressing 2 main questions: (1) what types of simple rules heuristics apply to BVIT and (2) what does a simple rules heuristics approach mean for our understanding of BVIT, in particular with respect to organizational learning and dynamics? We proposed a portfolio of heuristics consisting of six types of simple rules for capturing IT-based opportunities in dynamic environments: selection, procedural, priority, temporal, exit and synergy heuristics. We showed how these heuristics relate to the strategic aspects of IS. We introduced synergy heuristics as specifically relevant in an IT context as BVIT research has shown that IT resources need organizational complementaries to create business value.

We also discussed how simple rules heuristics can advance our understanding of dynamics and organizational learning for BVIT. Simple rules heuristics can help to better understand what is explicitly learned in the strategic processes for capturing IT-based opportunities. Simple rules heuristics can introduce flexibility into strategic processes of organizations that operate in dynamic environments and are essential for understanding the high-performing processes that are the key feature of (dynamic) capabilities. Moreover, we also argued that simple rules heuristics can introduce a strategic logic of opportunity to BVIT that focuses on how entrepreneurial action can support organizations in capturing attractive opportunities sooner, faster and more effectively than competitors.

This paper is an early stage, conceptual exploration of applying simple rules heuristics to BVIT. It is, to the best of our knowledge, the first paper introducing simple rules heuristics to the IS domain, in particular in relation to strategic processes and IT-based opportunities. A limitation of this paper is that we focus on BVIT and do not address the broader topics of strategy, innovation and organizational learning as discussed within the IS discipline. Moreover, we also did not address the underlying theoretical foundations of complexity and

cognition for simple rules heuristics. Finally, empirical exploration and confirmation is required to better understand the suitability of a simple rules heuristics approach for creating IT business value and capturing IT-based opportunities in dynamic environments.

7. References

Aral, S., & Weill, P. (2007). IT Assets, Organizational Capabilities, and Firm Performance: How Resource Allocations and Organizational Differences Explain Performance Variation. *Organization Science, 18*(5), 763–780.

Argote, L. (2013). *Organizational Learning: Creating, Retaining and Transferring Knowledge* (2 ed.). New York, NY: Springer.

Attewell, P. (1992). Technology Diffusion and Organizational Learning: The Case of Business Computing. *Organization Science, 3*(1), 1-19.

Barney, J. B. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management, 17*(1), 99-120.

Benamati, J., & Lederer, A. L. (2001). Rapid information technology change, coping mechanisms, and the emerging technologies group. *Journal of Management Information Systems, 17*(4), 183-202.

Bharadwaj, A. S. (2000). A Resource-Based Perspective on Information Technology Capability and Firm Performance: An Empirical Investigation *MIS Quarterly, 24*(1), 169-196.

Bhatt, G. D., & Grover, V. (2005). Types of Information Technology Capabilities and Their Role in Competitive Advantage: An Empirical Study. *Journal of Management Information Systems, 22*(2), 253-277.

Bingham, C. B., & Davis, J. P. (2012). Learning Sequences: Their Existence, Effect, and Evolution. *Academy of Management Journal, 55*(3), 611-641.

Bingham, C. B., & Eisenhardt, K. M. (2008). Position, leverage and opportunity: a typology of strategic logics linking resources with competitive advantage. *Managerial and Decision Economics, 29*(2-3), 241-256.

Bingham, C. B., & Eisenhardt, K. M. (2011). Rational heuristics: the 'simple rules' that strategists learn from process experience. *Strategic Management Journal, 32*(13), 1437-1464.

Bingham, C. B., & Eisenhardt, K. M. (2014). Heuristics in strategy and organizations: Response to Vuori and Vuori. *Strategic Management Journal* (online version).

Bingham, C. B., Eisenhardt, K. M., & Furr, N. R. (2007). What makes a process a capability? Heuristics, strategy, and effective capture of opportunities. *Strategic Entrepreneurship Journal, 1*(1-2), 27-47.

Chen, D., Mocker, M., Preston, D. S., & Teubner, A. (2010). Information Systems Strategy: Reconceptualization, Measurement, and Implications. *MIS Quarterly, 34*(2), 233-259.

Ciborra, C. U. (1992). From thinking to tinkering: The grassroots of strategic information systems. *The Information Society, 8*(4), 297-309.

Clemons, E. K., & Row, M. C. (1991). Sustaining IT Advantage: The Role of Structural Differences. *MIS Quarterly, 15*(3), 275-292.

Cohen, M. D., Burkhart, R., Dosi, G., Egidi, M., Marengo, L., Warglien, M., & Winter, S. (1996). Routines and Other Recurring Action Patterns of Organizations: Contemporary Research Issues. *Industrial and Corporate Change, 5*(3), 653-698.

Daniel, E. M., & Wilson, H. N. (2003). The role of dynamic capabilities in e-business transformation. *European Journal of Information Systems, 12*(4), 282-296.

Davenport, T., Hammer, M., & Metsisto, T. J. (1989). How Executives Can Shape Their Company's Information Systems. *Harvard Business Review, 67*(2), 130-134.

Davis, J. P., Eisenhardt, K. M., & Bingham, C. B. (2009). Optimal Structure, Market Dynamism, and the Strategy of Simple Rules. *Administrative Science Quarterly, 54*(3), 413-452.

Dehning, B., & Richardson, V. J. (2002). Returns on Investments in Information Technology: A Research Synthesis. *Journal of Information Systems, 16*(1), 7-30.

Earl, M. J. (1989). *Management strategies for information technology*. Hertfordshire, UK: Prentice Hall.

Eisenhardt, K. M., & Brown, S. L. (1997). The art of continuous change: linking complexity theory and time-paced evolution in relentlessly shifting organizations. *Administrative Science Quarterly, 42*(1), 1–34.

Eisenhardt, K. M., Furr, N. R., & Bingham, C. B. (2010). CROSSROADS—Microfoundations of Performance: Balancing Efficiency and Flexibility in Dynamic Environments. *Organization Science, 21*(6), 1263-1273.

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: what are they? *Strategic Management Journal, 21*(10-11), 1105-1121.

Eisenhardt, K. M., & Sull, D. N. (2001). Strategy as Simple Rules. *Harvard Business Review, 79*(1), 107-116.

El Sawy, O. A., Malhotra, A., Park, Y., & Pavlou, P. A. (2010). Seeking the Configurations of Digital Ecodynamics: It Takes Three to Tango. *Information Systems Research, 21*(4), 835-848.

Fichman, R. G. (2004). Real Options and IT Platform Adoption: Implications for Theory and Practice. *Information Systems Research, 15*(2), 132-154.

Fichman, R. G., & Kemerer, C. F. (1999). The Illusory Diffusion of Innovation: An Examination of Assimilation Gaps. *Information Systems Research, 10*(3), 255-275.

Henderson, J. C., & Venkatraman, N. (1993). Strategic alignment: Leveraging information technology for transforming organizations. *IBM Systems Journal, 32*(1), 4-16

Huber, G. P. (1991). Organizational Learning: The Contributing Processes and the Literatures. *Organization Science, 2*(1), 88-115.

Jeffery, M., & Leliveld, I. (2004). Best Practices in IT Portfolio Management. *Sloan Management Review, 45*(3), 41-49.

Jiang, J. J., & Klein, G. (1999). Project selection criteria by strategic orientation. *Information & Management, 36*(2), 63-75.

Kohli, R., & Grover, V. (2008). Business Value of IT: An Essay on Expanding Research Directions to Keep up with the Times. *Journal of the Association for Information Systems, 9*(1), 23-39.

Lyytinen, K., & Rose, G. M. (2003). The disruptive nature of information technology innovations: The case of Internet computing in systems development organizations. *MIS Quarterly, 27*(4), 557-595.

Mata, F. J., Fuerst, W. L., & Barney, J. B. (1995). Information technology and sustained competitive advantage: A resource-based analysis. *MIS Quarterly, 19*(4), 487.

Melville, N., Kraemer, K., & Gurbaxani, V. (2004). Information Technology and Organizational Performance: An Integrative Model of IT Business Value. *MIS Quarterly, 28*(2), 283-322.

Nambisan, S. (2013). Information Technology and Product/Service Innovation: A Brief Assessment and Some Suggestions for Future Research. *Journal of the Association for Information Systems, 14*(4), 215-226.

Nevo, S., & Wade, M. R. (2010). The Formation and Value of IT-Enabled Resources: Antecedents and Consequences of Synergistic Relationships *MIS Quarterly, 34*(1), 163-183.

Newkirk, H. E., Lederer, A. L., & Johnson, A. M. (2008). Rapid business and IT change: drivers for strategic information systems planning? *European Journal of Information Systems, 17*(3), 198-218.

Pavlou, P. A., & El Sawy, O. A. (2006). From IT Leveraging Competence to Competitive Advantage in Turbulent Environments: The Case of New Product Development. *Information Systems Research, 17*(3), 198-227.

Pavlou, P. A., & El Sawy, O. A. (2010). The "Third Hand": IT-Enabled Competitive Advantage in Turbulence Through Improvisational Capabilities. *Information Systems Research, 21*(3), 443-471.

Philip, G. (2007). IS Strategic Planning for Operational Efficiency. *Information Systems Management, 24*(3), 247-264.

Piccoli, G., & Ives, B. (2005). Review: IT-Dependent Strategic Initiatives and Sustained Competitive Advantage: A Review and Synthesis of the Literature. *MIS Quarterly, 29*(4), 747-776.

Porter, M. E. (1996). What Is Strategy? *Harvard Business Review, 74*(6), 61-78.

Porter, M. E. (2001). Strategy and the Internet. *Harvard Business Review, 79*(3), 62-79.

Quan, J., Hu, Q., & Hart, P. J. (2003). Information Technology Investments and Firms' Performance: A Duopoly Perspective. *Journal of Management Information Systems, 20*(3), 121-158.

Ravinchandran, T., & Lertwongsatien, C. (2005). Effect of Information Systems Resources and Capabilities on Firm Performance: A Resource-Based Perspective. *Journal of Management Information Systems, 21*(4), 237-276.

Rivard, S., Raymond, L., & Verreault, D. (2006). Resource-based view and competitive strategy: An integrated model of the contribution of information technology to firm performance. *The Journal of Strategic Information Systems, 15*(1), 29-50.

Robson, W. (1997). *Strategic Management and Information Systems: An Integrated Approach*. London: Pitman Publishing.

Ross, J. W., & Beath, C. M. (2002). Beyond the Business Case: New Approaches to IT Investment. *Sloan Management Review, 43*(2), 51-59.

Sambamurthy, V., Bharadwaj, A., & Grover, V. (2003). Shaping agility through digital options: Reconceptualizing the role of information technology in contemporary Firms. *MIS Quarterly, 27*(2), 237-263.

Scott, G. M. (2005). Still Not Solved: The Persistent Problem of IT Strategic Planning. *Communications of AIS, 16*(1), 904-936.

Segars, A. H., & Grover, V. (1999). Profiles of Strategic Information Systems Planning. *Information Systems Research, 10*(3), 199-232.

Soh, C., & Markus, M. L. (1995). How IT Creates Business Value: A Process Theory Synthesis *Proceedings of the 16th International Conference on Information Systems (ICIS 1995)* (pp. 29-41). Amsterdam, The Netherlands: Association for Information Systems.

Swanson, E. B. (1994). Information Systems Innovation Among Organizations. *Management Science, 40*(9), 1069-1092.

Swanson, E. B., & Ramiller, N. C. (1997). The Organizing Vision in Information Systems Innovation. *Organization Science, 8*(5), 458-474.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic Capabilities and Strategic Management. *Strategic Management Journal, 18*(7), 509–533.

Tippins, M. J., & Sohi, R. S. (2003). IT competency and firm performance: is organizational learning a missing link? *Strategic Management Journal, 24*(8), 745-761.

Wade, M. R., & Hulland, J. (2004). The Resource-Based View and Information Systems Research: Review, Extension, and Suggestions for Future Research. *MIS Quarterly, 28*(1), 107-142.

Wang, N., Liang, H., Zhong, W., Xue, Y., & Xiao, J. (2012). Resource Structuring or Capability Building? An Empirical Study of the Business Value of Information Technology. *Journal of Management Information Systems, 29*(2), 325 - 367.

Wang, P. (2010). Chasing the Hottest IT: Effects of Information Technology Fashion on Organizations. *MIS Quarterly, 34*(1), 63-85.

Weill, P., & Aral, S. (2006). Generating Premium Returns on Your IT Investments. *Sloan Management Review, 47*(2), 39-48.

Weill, P., & Ross, J. W. (4004). *IT Governance: How Top Performers Manage IT Decision Rights for Superior Results*. Boston, MA: Harvard Business School Press.

Wheeler, B. C. (2002). NEBIC: A dynamic capabilities theory for assessing Net-enablement. *Information Systems Research, 13*(2), 125-146.

Winter, S. G. (2003). Understanding dynamic capabilities. *Strategic Management Journal, 24*(10), 991-995.

Wolf, M., Beck, R., & Pahlke, I. (2012). Mindfully resisting the bandwagon: reconceptualising IT innovation assimilation in highly turbulent environments. *Journal of Information Technology, 27*(3), 213-235.